Network analyzer

for low, medium and high voltage power supplies

- Clarification of error
- Assessment of voltage quality acc. to EN50160 and IEC61000-2-2
- Disturbance recorder functions
- Load analyses; energy measurements
- Ripple control frequency measuremen

Usage:

The **multilog 2** is a powerful, portable network analyzer, power meter and transient recorder. The objective of the development was to render the measuring instrument user-friendly.

The **multilog 2** was developed for mobile operation (protection class IP65) and is suitable for measurements in the public network (CAT IV) and for measurements in industrial environments up to 690V measuring voltage.
The device meets the requirements of the test equipment standard IEC61000-4-30 for a Class A appliance for the following parameters.

Parameter	Class
Precision of voltage measurement	A
Determination of time interval	A
Marking measured values in case of events	A
Harmonics, subharmonics	A
Frequency	A
Voltage asymmetry	A
Event recording	A
Time synchronization	A

The small dimensions allow assembly in small rooms and switching cabinets, even right next to current-carrying components. With the voltage supply via measuring circuits and the application-related default setting for all trigger conditions, the equipment is very easy to handle.

To be able to quickly localize what has caused network errors, the equipment is supplied with a variety of trigger options. A fast USB 2.0 interface is available for data transmission. In case of power failure, the built-in uninterruptable power supply takes over operation.

Measurement function:

The **multilog 2** is available in two models:

1) **multilog 2 light**
   The device is suitable for power analyses and for voltage quality analyses in accordance with EN50160 and IEC61000-2-2.
2) **multilog 2 expert**
   The device variation has extensive additional trigger options. Fast oscilloscope images and 10 ms RMS values can be recorded.

By obtaining a license, a „light" version can be subsequently upgraded to an „expert" version.

The **multilog 2** records over 1,600 different measured values in a continuous recording: voltage, current, frequency, power, energy consumption, asymmetry, flikker, harmonics and subharmonics. Without a restriction on the number of parameters, the measuring interval for permanent recording can be set to a minimum of one second.

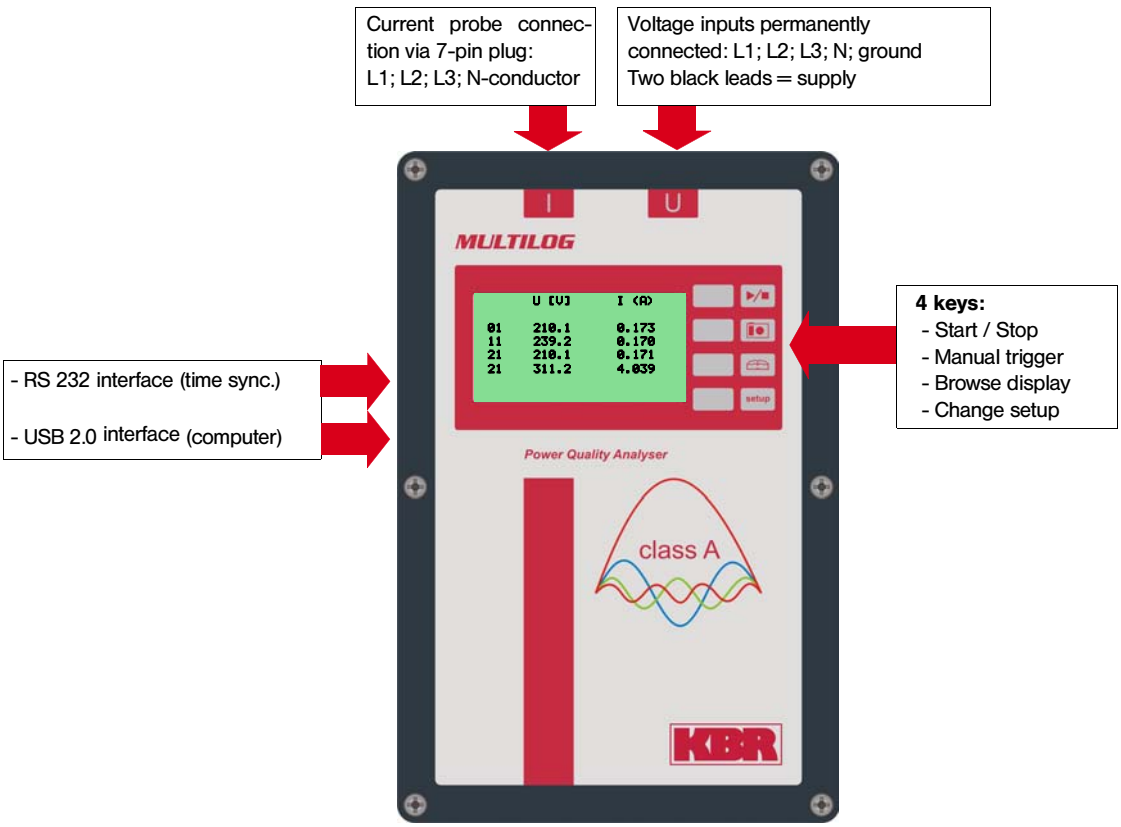
Measured quantities / Function		
multilog 2	**light**	**expert**
Standards statistics acc. to EN50160 / IEC61000-2-2	x	x
Continuous recording of:		
Voltage: Average, min., max. value	x	x
Current, average, min., max. value	x	x
Power: P, Q, S, PF, cos phi	x	x
Distortion reactive power: D	x	x
Energy: P, Q, P+, P-, Q+, Q-	x	x
Flicker (Pst, Plt, output 5)	x	x
Asymmetry (U, I)	x	x
Voltage and current harmonic, THD	50.	50.
Subharmonic groups (U, I)	50.	50.
Ripple-control signal	x	x
Frequency	x	x
Online mode:		
Oscilloscope image	x	x
RMS values	x	x
Voltage and current harmonic (up to 5 kHz)	x	x
Subharmonic groups (U, I)	x	x
Direction of energy flow of harmonics	x	x
Trigger functions:		
Manual trigger via key	x	x
RMS value underflow (U, I)		x
RMS value overflow (U, I)		x
RMS value step change (U, I)		x
Phase step change		x
Envelope curve trigger		x

Structure:

The robust mechanical structure and protection class IP65, as well as the lack of rotating parts, such as fan or hard drive, make the unit suitable for the toughest field use.
The **multilog 2** is equipped with a large memory of 1 GB. It is therefore possible to store measured values over long periods, even up to one year. In case of mains failure, an internal UPS bridges the voltage supply for the network analyzer for several minutes.
No separate plug is required for the voltage supply, it can be picked up directly from the measuring circuits.

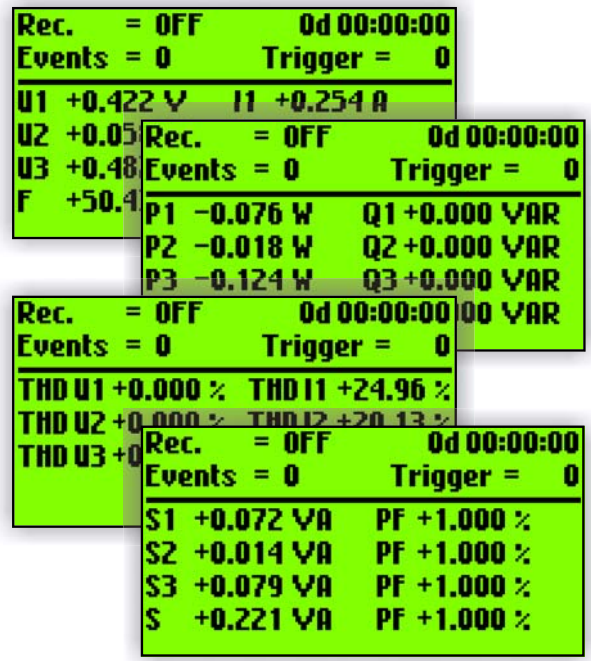
Evaluation of measured data

Recorded data are transmitted to the evaluation computer via a fast USB interface. The unit is powered via the USB interface of the computer while data are being read out. The practice-oriented evaluation software is included in the delivery, and can be installed on any number of computers.
The software offers a wide range of evaluation options, such as load analysis, determining the cause of network disruptions, creates automatic reports in accordance with EN50160/IEC61000-2-2 and provides extensive online functions.
Updates for the evaluation software are available on the Internet free of charge.



Display:

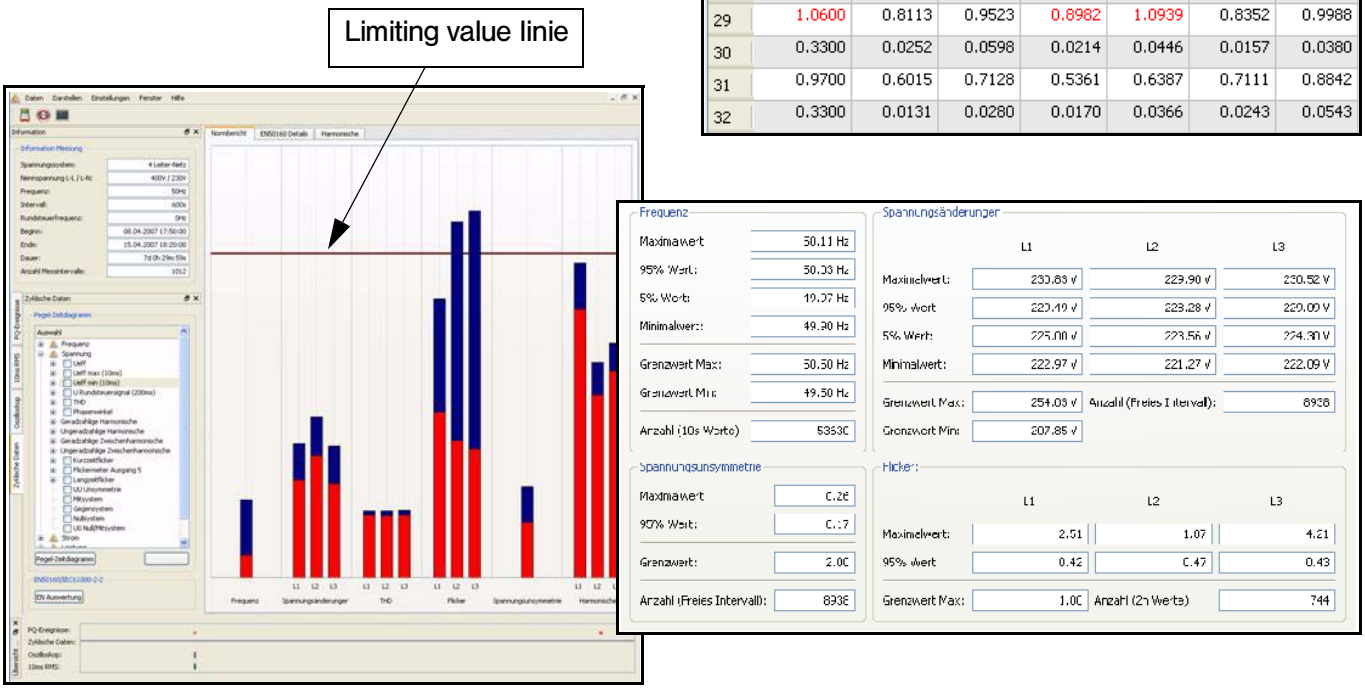
The unit display informs you of the correct connection of measurement leads and circuits and current probes, shows online data for voltage, current, THD and power. The number of events that have occurred, as well as the measuring period recorded, are shown to the user in the display. To prevent manipulation to the unit by third parties, a keyboard lock can be switched on.


Rec. = OFF 0d 00:00:00
Events = 0 Trigger = 0
U1 +0.422 V I1 +0.254 A
U2 +0.05
U3 +0.48
F +50.4
Rec. = OFF 0d 00:00:00
Events = 0 Trigger = 0
P1 -0.076 W Q1 +0.000 VAR
P2 -0.018 W Q2 +0.000 VAR
P3 -0.124 W Q3 +0.000 VAR
Rec. = OFF 0d 00:00:00
Events = 0 Trigger = 0
THD U1 +0.000 % THD I1 +24.96 %
THD U2 +0.000 % THD I2 +20.13 %
THD U3 +0
Rec. = OFF 0d 00:00:00
Events = 0 Trigger = 0
S1 +0.072 VA PF +1.000 %
S2 +0.014 VA PF +1.000 %
S3 +0.079 VA PF +1.000 %
S +0.221 VA PF +1.000 %

EN50160 / IEC61000-2-2 Evaluation

This evaluation provides a quick overview of the supply quality. You can immediately determine which measured data need to be looked at more closely by means of the red and blue bars

	Grenzwert	L1 - 95%	L1 - Max	L2 - 95%	L2 - Max	L3 - 95%	L3 - Max
THD	8.0000	9.9078	10.8013	9.8845	10.8618	9.6749	10.6322
2	2.0000	0.0491	0.4872	0.0753	0.6018	0.0934	0.8582
3	5.0000	7.0690	7.3882	7.0615	7.4042	6.8353	7.1752
4	1.0000	0.0373	0.2905	0.0522	0.3933	0.0378	0.2450
5	6.0000	6.6206	8.6708	6.5608	8.6705	6.5443	8.6402
6	0.5000	0.0396	0.2837	0.0344	0.2309	0.0397	0.3380
7	5.0000	3.7169	3.9841	4.0670	4.3392	4.1419	4.3757
8	0.5000	0.0263	0.1167	0.0270	0.1683	0.0318	0.1684
9	1.5000	0.9168	1.0499	0.9051	1.1623	0.9500	1.1896
10	0.5000	0.0298	0.1081	0.0214	0.1065	0.0212	0.1323
11	3.5000	1.3910	1.5202	1.2282	1.4391	1.1657	1.5114
12	0.5000	0.0202	0.1591	0.0298	0.0851	0.0247	0.1584
13	3.0000	0.9774	1.1393	0.8026	1.1985	1.0147	1.3059
14	0.5000	0.0307	0.0854	0.0291	0.0744	0.0284	0.0911
15	0.5000	0.5193	0.5715	0.5184	0.5770	0.5165	0.5743
16	0.5000	0.0223	0.0953	0.0270	0.0646	0.0257	0.0800
17	2.0000	0.7209	0.8874	0.7405	0.9215	0.7510	0.9076
18	0.5000	0.0158	0.0724	0.0147	0.0540	0.0139	0.0671
19	1.5000	0.4153	0.5838	0.4225	0.5462	0.5071	0.6482
20	0.5000	0.0189	0.0547	0.0177	0.0482	0.0175	0.0596
21	0.5000	0.2885	0.3393	0.3404	0.3744	0.2658	0.3125
22	0.5000	0.0163	0.0657	0.0215	0.0695	0.0198	0.0544
23	1.5000	0.8103	0.9975	0.8159	1.0351	0.8092	0.9930
24	0.5000	0.0205	0.0515	0.0183	0.0452	0.0141	0.0492
25	1.5000	0.4869	0.7165	0.4915	0.6259	0.6100	0.8238
26	0.3500	0.0125	0.0299	0.0148	0.0349	0.0194	0.0490
27	0.2000	0.1823	0.2854	0.2844	0.3348	0.2174	0.2721
28	0.3400	0.0206	0.0338	0.0238	0.0524	0.0217	0.0531
29	1.0600	0.8113	0.9523	0.8982	1.0939	0.8352	0.9988
30	0.3300	0.0252	0.0598	0.0214	0.0446	0.0157	0.0380
31	0.9700	0.6015	0.7128	0.5361	0.6387	0.7111	0.8842
32	0.3300	0.0131	0.0280	0.0170	0.0366	0.0243	0.0543


Limiting value linie
Frequenz
Maximalwert 50.11 Hz
95% Wert: 50.03 Hz
5% Wert: 49.97 Hz
Minimalwert: 49.90 Hz
Grenzwert Max: 50.50 Hz
Grenzwert Min 49.50 Hz
Anzahl (10s Werte) 5353C
Spannungsänderungen
L1 L2 L3
Maximalwert: 230.68 V 229.90 V 230.52 V
95% Wert 229.49 V 228.28 V 229.00 V
5% Wert: 225.00 V 223.56 V 224.30 V
Minimalwert: 222.97 V 221.27 V 222.09 V
Grenzwert Max: 254.03 V Anzahl (Freies Intervall): 8936
Grenzwert Min 207.85 V
Spannungsunsymmetrie
Maximalwert C.2E
95% Wert: C.:7
Grenzwert: 2.0C
Anzahl (Freies Intervall): 893E
Flicker
L1 L2 L3
Maximalwert: 2.51 1.07 4.21
95% Wert 0.42 C.47 0.43
Grenzwert Max: 1.0C Anzahl (2h Werte) 744

EN50160 / IEC61000-2-2-Bericht

Keys:

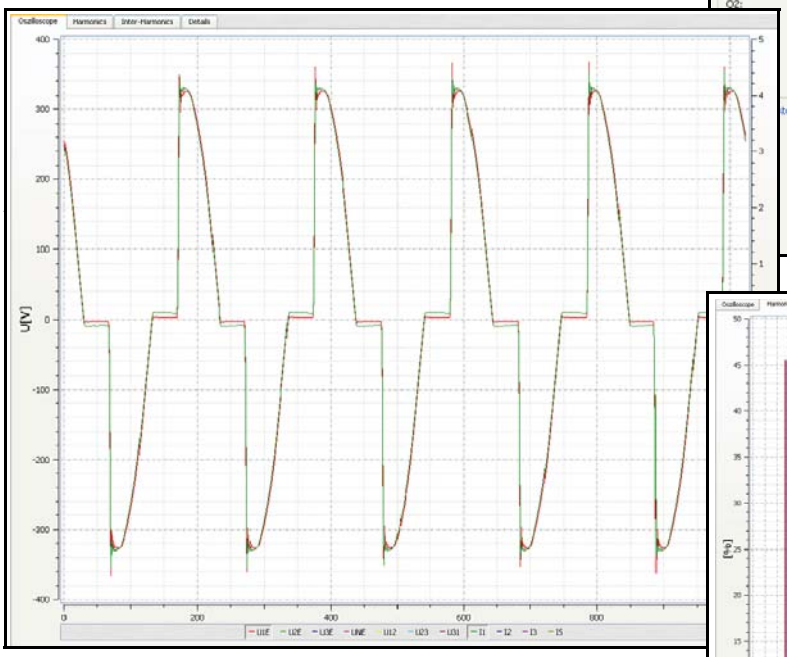
Measurements are started and stopped via a ”Start/ Stop” key. As many measurements as you like can be recorded one after the other, without the need for data to be read out first from the unit.
The ”manual trigger” key allows the current status of a facility to be recorded as an oscilloscope image and as a 10ms RMS value recording.
The screens can be scrolled with two other keys. It is also possible to make settings on the unit (e.g. transformer configurations for current and voltage transformers, measuring interval, nominal voltage and network type).

Time synchronization:

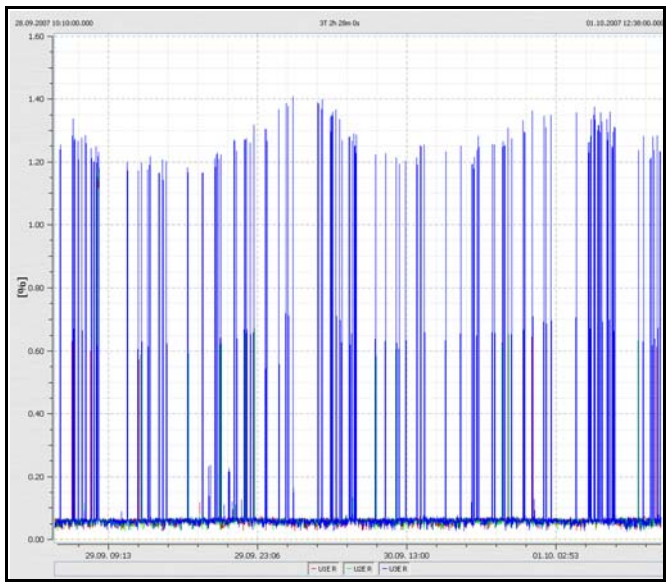
For the correlation of measured data from different units, a time synchronization is necessary. For this purpose, radio clocks for GPS and DCF77 signals are available.

Online analysis software on computer

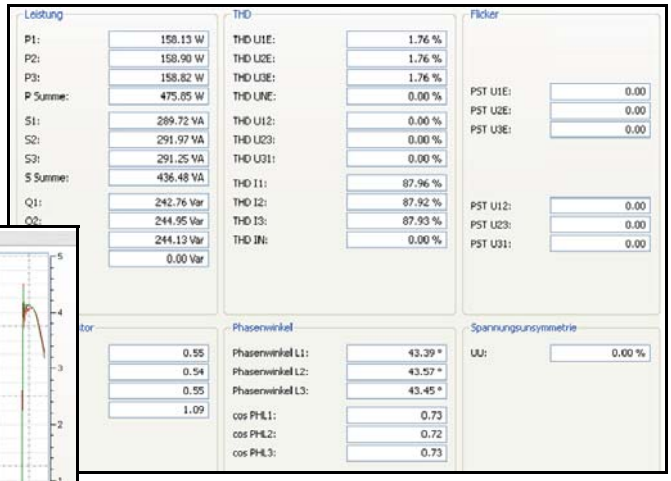
A more extensive online analysis software shows the current waveform of the current and voltage signals in real time and depicts the harmonics and subharmonics of DC up to 5,000 Hz. The direction of energy flow of the harmonic at the measuring point, as well as the present power values are shown (active power, reactive power, distortion reactive power, cos-phi, phase angle, power factor).

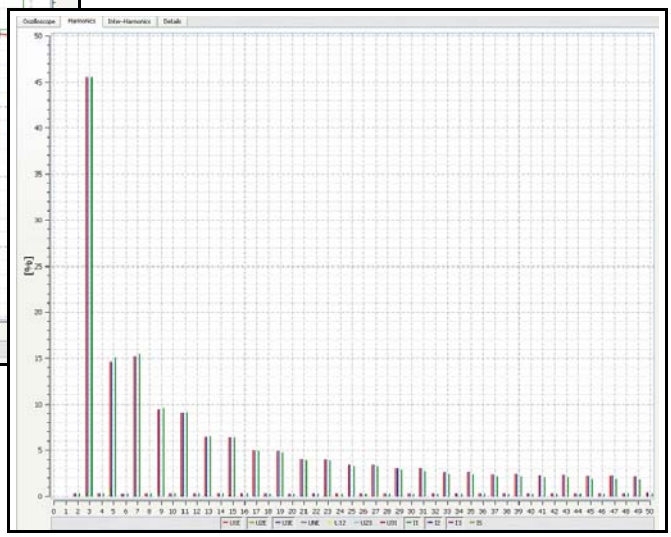


Online oscilloscope image



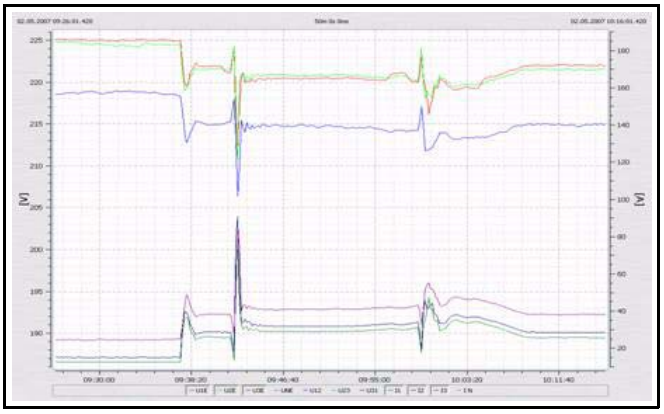
In addition to the harmonics, the **multilog 2** can record any frequency between 0 and 5 kHz. This function is suitable for the evaluation of the signal level of ripple control signals.



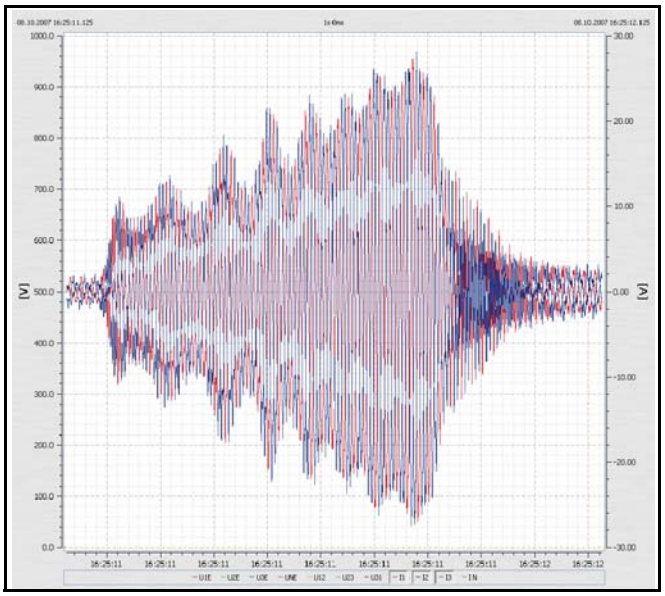


Online harmonics voltage and current

Interference records as oscilloscope image and 10ms RMS record



10ms RMS record (motor start-up)



Oscilloscope image

Continuous recording

Voltage, 3-phase current

Hardware variation:

Version	
multilog 2 (4U/4I)	**(A2)**
4 voltage inputs:	L1, L2, L3, N, PE; 400 V L-N; 690 V L-L AC / DC
4 current inputs:	230 mV input for Mini-current probes and Rogowski current probes
Scanning rate:	10,24 kHz at 50 Hz
Automatic synchronization to fundamental:	45 Hz to 65 Hz
Measuring interval:	freely adjustable from 1 sec. to 30 minutes
Data storage:	1 GB
Interfaces:	USB 2.0
Time synchronization:	DCF77 or GPS radio clock
Dimensions:	220 x 146 x 57 mm
Weight:	1,7 kg
Protection class:	IP 65
IEC 61000-4-30:	Class A
Accuracy:	< 0,1%
Insulation category:	CAT IVA/D
Transformer:	24 Bit
Resistance to extreme climates	Operation: -20 ….70
Temperatur:	Storage: -30 ….80
Display:	illuminated
Supply voltage:	100 V…400 V AC or 100 V...220 V DC

EMC:

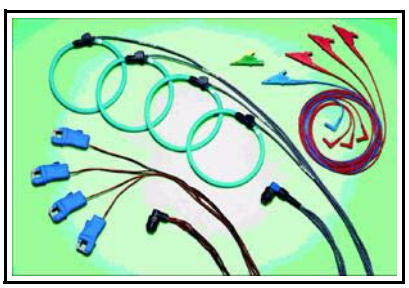
CE conformity:	
- immunity to interference	EN 61326
	EN 61000-6-2
- emitted interference	EN 61326
	EN 61000-6-4
ESD	IEC 61000-4-2
	8 kV / 16 kV
	IEC 60 255-22-2
Electromagnetic fields	IEC 61000-4-3
	10 V/m
	IEC 60 255-22-3

Burst	IEC 61000-4-4 4 kV / 2 kV IEC 60 255-22-4
Surge	IEC 61000-4-5 4 kV / 2 kV
1 MHz Burst	IEC 61000-4-12 2,5 kV, Class III IEC 60 255-22-1
HF lead-connected	IEC 61000-4-6 10 V, 150 kHz- 80 MHz
Magnetic fields	IEC 61000-4-8 100 A/m permanent 1000 A/m 1s
Voltage dips	IEC 61000-4-11 100% 1min
Emitted interference	EN 61326 EN 61000-6-4
- Housing	at 10 m distance 30–230 MHz, 40 dB 230-1000 MHz, 47 dB
- AC mains connection	at 10 m distance 0,15–0,5 MHz, 79 dB 0,5–5 MHz, 73 dB 5–30 MHz, 73 dB

Intelligent accessories:

The accessories are also well thought out. The **multilog 2** automatically detects the connected current probe set through a coding in the plug and adjusts the measuring intervals accordingly. The unit does not have to be informed of the transfer ratio for the respective probe.

Current probes for
multilog 2



Technical data

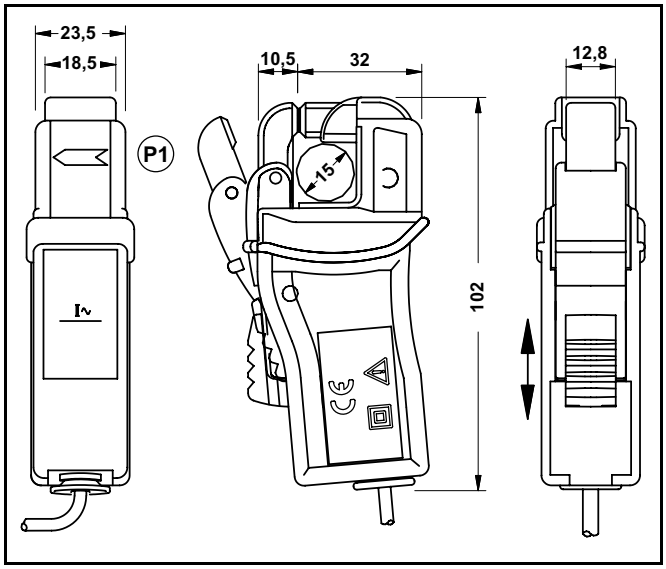
Miniature current probes:

The probe is intended specifically for measurements on secondary transformers in MS or HS networks. It combines very high precision with small phase displacements.

Current range:	25 A AC RMS
Measuring range:	100 mA to 25 A RMS
Output voltage:	10 mV / A
Frequency range:	40 Hz to 5 kHz
Working voltage:	600 V AC / DC

Accuracy:

Current 50Hz	100 mA	1 A	10 A
Accuracy	• 1.5%	• 1%	• 0,5%
Phase displacements	1,5	1	0,5

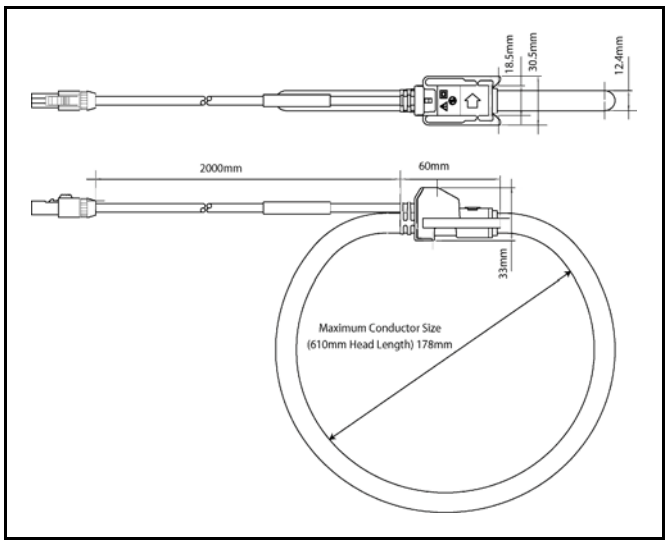


Size of mini current probe

Technical data

Rogowski current probes:

Measuring range:	1 A to 2.650 A RMS
Output voltage:	85 mV / 1000 A
Frequency range:	1 Hz to 10 kHz
Working voltage:	1000 V AC CAT. III
Accuracy:	1%
Phase displacements (45 – 65Hz):	1
Length of Rogowski current probe head:	610 mm
Connection lead length:	2 m



Dimensions for Rogowski current probe

Order details

The following applies when determining the order details:
• Only one of the codes with the same capital letter may be chosen.

Characteristic:		**Code**	
Disturbance recorder and network analyzer in accordance with DIN EN 50160 and IEC 61000-3-40 Class A Mobile power quality network analyzer and power meter for low, medium and high voltage networks in accordance with DIN EN-50160/ IEC 61000-4-30 Class A - 1 GB flash memory - USB interface - Display - IP65; with uninterruptable power supply - USB lead set - Connection lead for voltage - 2 supply leads - Dolphin clamps - Bag for current probes		**multilog 2**	
Model:	Network analyzer (light) Network analyzer and interference recorder (expert)	B1 B2	
User manual and display:	German English French Spanish Italian Dutch Czech Russian Polish	G1 G2 G3 G4 G5 G6 G7 G8 G9	

Accessories

multilog 2 upgrade:
Upgrate from version ”light” (B1) to ”expert” (B2)

Rogowski coils set of 4
1…2650 A

Mini-current probes set of 4
0...25 A

Mini-current probes set of 3
0...25 A

Mini-current probe unit
0…200 A

Adapter lead set to connect current probes
with 4 mm banana plugs

DCF 77 radio clock

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